Decommissioning of the Long Lake Water Control Structure Environmental Registration

Final Report

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Prepared for:

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DECOMMISSIONING OF THE LONG LAKE WATER CONTROL STRUCTURE ENVIRONMENTAL REGISTRATION

Table of Contents

LIST OF FIGURES

LIST OF TABLES

Abbreviations

µm	micrometre
µg/m^3	microgram per cubic metre
ATV	All-terrain Vehicle
cm	centimetre
CNF	Central Newfoundland Forest
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EPP	Environmental Protection Plan
FHCP	Fish Habitat Compensation Plan
HADD	Harmful Alteration, Disruption, or Destruction
km	kilometre
km^2	square kilometre
kW	kilowatt
m	metre
m/s	metre per second
m2	square metre
mW	megawatt
NLDECC	Newfoundland and Labrador Department of Environment and Climate Change
NLDFFA	Newfoundland and Labrador Department of Fisheries, Forestry, and Agriculture
NL ESA	Newfoundland and Labrador *Endangered Species Act*
NL Hydro	Newfoundland and Labrador Hydro
NOC	National Occupational Classification
PM	Particulate Matter
SAR	Species at Risk
SARA	*Species at Risk Act*
TSP	Total Suspended Particles
TSS	Total Suspended Solids
WCS	Water Control Structure

1.0 INTRODUCTION

1.1 NAME OF UNDERTAKING

Decommissioning of the Long Lake Water Control Structure

1.2 PROPONENT INFORMATION

Name of the Corporate Body:	Newfoundland and Labrador Hydro
Address:	500 Columbus Drive PO Box 12400 St. John's NL A1B 4K7
Company Representative:	Scott Crosbie Vice President Operations
Principal Contact for Environmental Assessment:	Trent Carter Environmental Specialist

1.3 PROJECT OVERVIEW

Newfoundland and Labrador Hydro (NL Hydro) is proposing to decommission a former water control structure (WCS) at Long Lake, Newfoundland and Labrador (the Project). The undertaking will support NL Hydro's commitment to fulfill the requirements of the Fish Habitat Compensation Plan (FHCP) as identified under the *Fisheries Act* Authorization (98-03-001) issued for the Star Lake Hydroelectric Project. Following the decommissioning activities, the river channel within the footprint of the WCS will be restored to a more natural state to facilitate fish passage upstream, improve habitat connectivity and genetic diversity of native fish species.

The Project is located within the Victoria River sub-watershed (Figure 1.1), which is in the Exploits Watershed. Due to its location within 200 m of the highwater mark of a river that is a scheduled salmon river under the *Fisheries Act*, the Project requires Registration under the *Environmental Assessment Regulations* of the *NL Environmental Protection Act*. This document serves as the Registration and is being submitted to the Newfoundland and Labrador Department of Environment and Climate Change (NLDECC) – Environmental Assessment (EA) Division. An amended FHCP/Offsetting Plan is also being submitted to Fisheries and Oceans Canada (DFO).

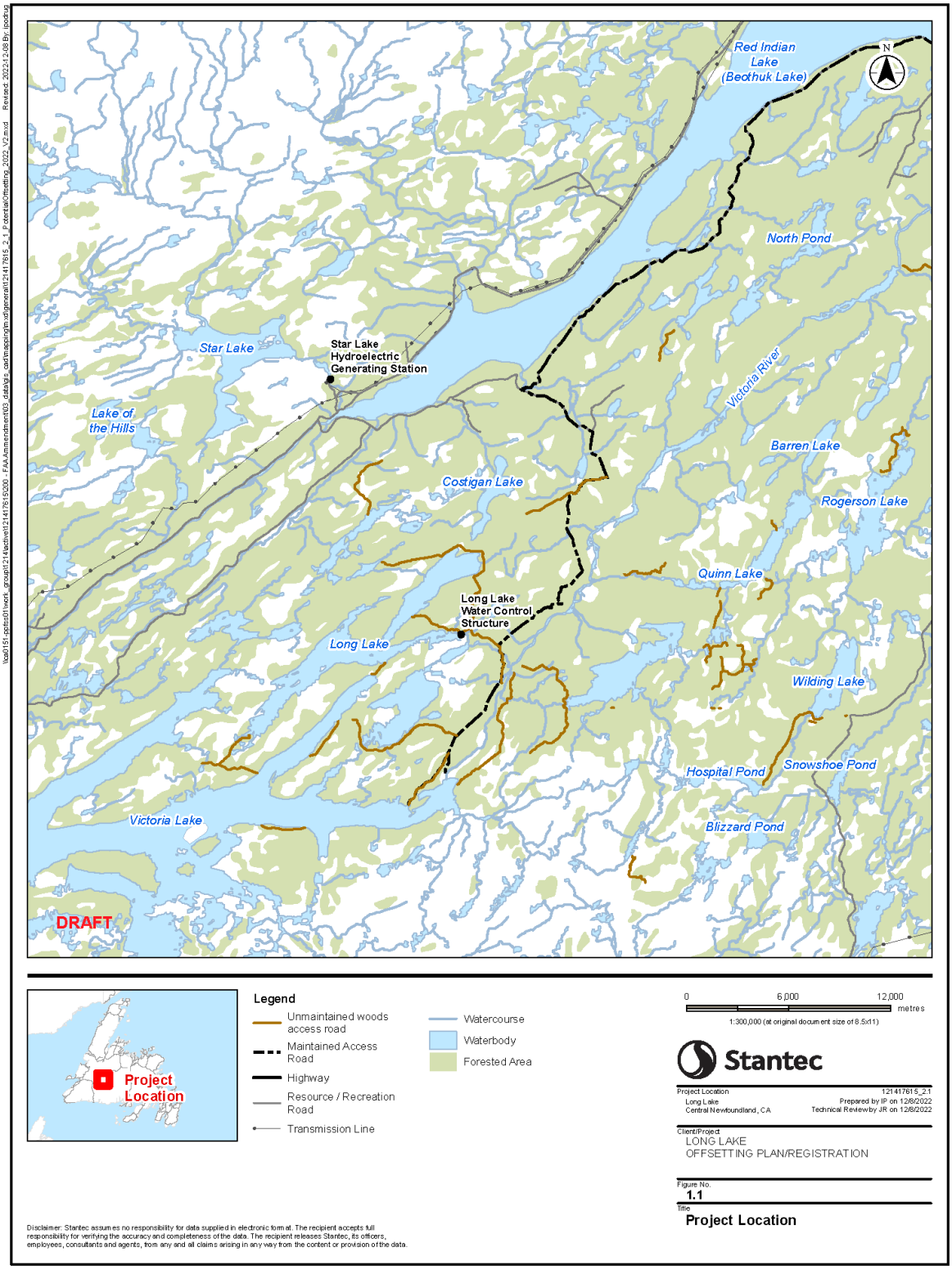

Figure 1.1 Project Location

1.4 PURPOSE / RATIONALE / NEED FOR THE UNDERTAKING

1.4.1 Background

The Star Lake Hydroelectric Generating Station has an installed capacity of 18 MW and is located approximately 45 km southwest of the town of Buchans, NL. It was constructed by the Star Lake Hydro Partnership, which included Abitibi-Consolidated and Enel Green Power Canada. Operation of the generating station began in 1998, providing power to the Abitibi-Consolidated Grand Falls paper mill. Abitibi-Consolidated, the majority owner of the Partnership, ceased operation of the Grand Falls paper mill in 2008 and, in December of that year, the province expropriated the timber, water use, and assets formerly held by Abitibi-Consolidated on the island of Newfoundland. The Star Lake Hydroelectric Generating Station is now owned by the province and NL Hydro assumed operational responsibility for the asset in April 2011.

The agreement included provisions for the continuation of the FHCP issued for the generating station. The FHCP was developed as part of the *Fisheries Act* Authorization to compensate for 1,056 units (1 unit = 100 m²; 105,600 m²) of productive spawning and rearing fish habitat lost from the flooding of the original lake's littoral zone and the lower portions of its tributaries to create the reservoir. The FHCP outlined the habitat offsetting project components that included the design and implementation of a breeding program to maintain the genetic variability of brook trout (*Salvelinus fontinalis*) from Star Lake and the construction of an egg incubation and rearing facility to facilitate the breeding program.

1.4.2 Purpose of Undertaking

There have been challenges in fulfilling the artificial spawning and rearing program objective of the FHCP as a result of the decreasing population of brook trout in Star Lake. Specifically, there have been difficulties obtaining sufficient numbers of wild brook trout broodstock from Star Lake to supply an adequate number of eggs for the artificial spawning and rearing program. As a result of the challenges fulfilling the FHCP, DFO and NL Hydro have agreed that it is in the best interest of all parties that alternative FHCP be pursued. The purpose of this Project is therefore to fulfill the offsetting requirements through an alternative FHCP/Offsetting Plan.

1.5 APPROVAL OF THE UNDERTAKING

The permits and authorizations, or amendments to existing permits and authorizations, that may be required for the Project are provided in Table 1.1.

Table 1.1 Permits and Authorizations that may be Required for the Project

Permit or Authorization	Agency	Notes
Release of the Undertaking under the EA Regulations	NLDECC - EA Division	The Environmental Registration document represented the "application" for this regulatory process
Permit to Alter a Waterbody	NLDECC – Water Resources Management Division	Required for decommissioning of the WCS
Permit to Cut Crown Timber	Newfoundland and Labrador Department of Fisheries, Forestry, and Agriculture (NLDFFA) – Forest Management	A permit is required for cutting of timber on crown land
Operating Permit	Newfoundland and Labrador Department of Fisheries, Forestry, and Agriculture (NLDFFA) – Forest Management	Required for industrial operation on forested lands during the forest fire season
Fisheries Act Authorization Amendment	DFO	NL Hydro will submit an amendment to the original authorization which includes the newly proposed offsetting plan (formerly the FHCP)

2.0 PROJECT DESCRIPTION

2.1 LOCATION

The Project is located at Long Lake within the Victoria River sub-watershed, which is in the upper Exploits Watershed (Figure 1.1). Long Lake has a surface area of 23,865,500 m^2. Access is via a 73 km well-maintained woods road from Millertown, followed by an unmaintained 2.8 km woods road (access road) which is currently only accessible by all-terrain vehicle (ATV). Coordinates for the undertaking are provided in Table 2.1.

Table 2.1 Location of Undertaking

Coordinates	Latitude (degrees)	Longitude (degrees)
Former Water Control Structure at Long Lake	48.433037	-57.108356

2.2 PROJECT COMPONENTS

Key Project components, shown in Figure 2.1 and described in the subsections below, include:

- Minor maintenance of the existing 2.8 km access road to a fit-for-use standard
- Decommissioning of the abandoned WCS
- Restoration of the stream channel within the footprint of the abandoned WCS

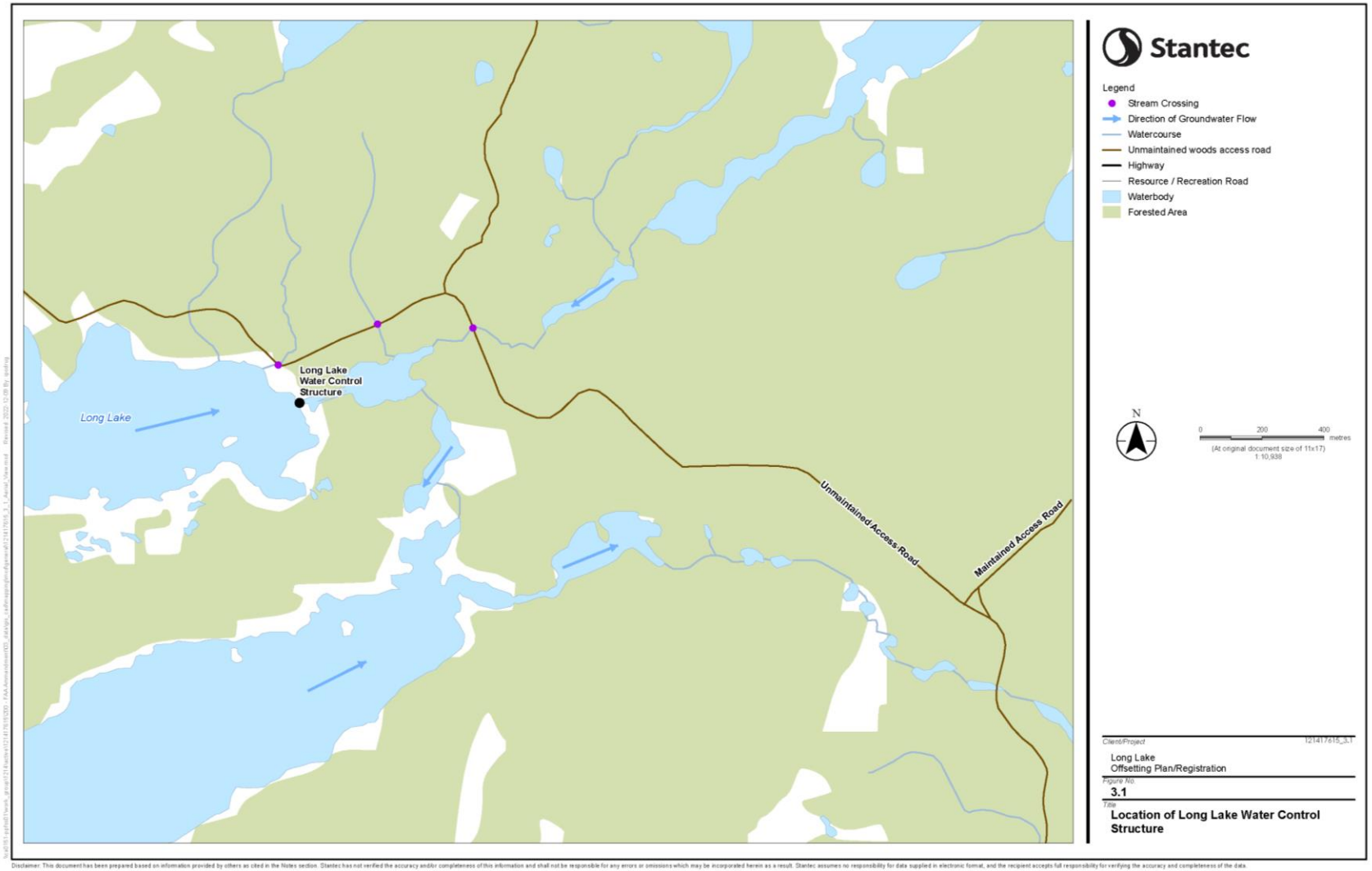

Figure 2.1 Overview of Project Components

2.2.1 Access Road

There is an unmaintained overgrown 2.8 km woods access road which is currently only marginally accessible by ATV. The road will undergo maintenance to be “fit for purpose” to allow the safe movement of equipment and personnel to site (Figure 2.1) in order to complete the proposed undertaking. Additional detail on the maintenance activities is provided in Section 2.3.1.

2.2.2 Water Control Structure

The WCS on Long Lake was originally constructed in 1953 to drive pulpwood (P. Robbins 2021 pers. comm.). It was rebuilt in 1968 and eventually deteriorated to the point where it was abandoned in 1976. In 1987, the Long Lake WCS was reconstructed and was used to store water to sustain hydroelectric production at Grand Falls and Bishops Falls during periods of low flow. Water storage in Long Lake ceased in 2005, stop logs were removed, and the structure was abandoned.

The WCS is constructed of wood timber and rock cribbing and measures approximately 9.35 m wide and 13.2 m long and consists of four openings (Figures 2.2-2.4). There are three large openings (2.5 m wide) where stop logs were placed to control the water level in the lake. The fourth opening (1.80 m wide) was a former fishway and contains a metal control valve, gate, and curved channel along the edge of the right-hand bank, when facing downstream. The base of the WCS consists of a degraded wooden deck which lies on top of a rock-filled base.

Figure 2.2 Long Lake WCS – Top View

Figure 2.3 Long Lake WCS – Facing Upstream

Figure 2.4 Long Lake WCS – Facing Downstream

The fish passage assessment conducted indicated that the Long Lake WCS is a complete barrier to brook trout and a partial barrier to ouananiche (Stantec 2023 draft in preparation). For the fish passage assessment, it was assumed that fish passage is not currently possible through the fourth opening as it is blocked with rocks or debris. Within each of the three openings there is a lip connecting the upstream and downstream portions of the deck, which has degraded over time and currently has 1 to 2.5 cm gaps in the wood, allowing water to be entrained. It is anticipated that these gaps can allow small fish to fall through the deck during up and down steam migration, and become trapped in the rock base of the WCS, potentially leading to fish mortality.

At the time of the ground assessment, water depth varied from 0.04 to 0.06 m at the downstream end of the opening and water velocities were 0.118 to 0.766 m/s. A the time of the survey, the deck of the WCS is perched relative to the downstream water surface by approximately 0.54 m. Based on the ordinary high water mark it appears that the deck is likely perched relative to the water's surface during the majority of the year. In addition, the third opening has a "step" at the downstream end of the deck which may further inhibit fish passage during low flow conditions (Figure 2.3). There is pool at the base of the WCS, which at the time of the survey was 0.43 to 0.77 m in depth.

2.2.3 Restoration of the Stream Channel

NL Hydro is planning to restore the stream channel within the footprint of the former WCS. Following the removal of the WCS, the stream bed and shoreline will be restored to match the existing conditions and provide long-term stability against erosion. The specific details of restoration of the stream channel will be determined in the field based on existing on-site constraints and the existing channel and will include a low-flow channel (e.g., thawleg). Cobble, rubble, and boulders will be placed within the stream channel using heavy equipment to create a more natural channel slope and provide areas of energy dissipation or resting areas for fish.

The stream bank near the wing walls will be recontoured to a more natural slope. Mulch, hay or rocks from the abutments will be used to stabilize the streams banks. The stream bank will be revegetated with native plants (i.e., alders).

2.3 PROJECT ACTIVITIES

The Project consists of the following activities:

- Maintenance and use of the existing forestry access road to allow equipment to access the site
- Removal of the abandoned Long Lake WCS and restoration stream channel within the vicinity of former WCS

It is anticipated that the Project activities will take place over approximately one month.

2.3.1 Maintenance and use of the Access Road

Access to the WCS is through an existing 73 km well maintained woods road from Millertown, NL followed by an unmaintained 2.8 km woods access road with a berm, which is accessible by ATV. The vegetation associated with the unmaintained woods access road will need to be cut back and maintenance may need to be performed on the roadbed to facilitate the transport of equipment to the Project site. This is anticipated to include:

- Cutting back of overgrown vegetation manually or with heavy equipment
- Use of existing stream crossings (e.g., culverts) or temporary stream crossing if required (e.g., fording)
- Minor modifications to the roadbed (e.g., temporary removal of the berm at the entrance of the road)

It is anticipated that cutting back of overgrown vegetation will be completed manually or with heavy equipment such as a road-side brush cutter or excavator. Access to the site will be via ATV or side by side. It is anticipated that heavy equipment (e.g., excavator) will be brought to site upon completion of road maintenance and will remain at site for the duration of the Project. Staff will access the site daily. Once the Project is complete, the berm at the entrance of the unmaintained 2.8 km woods road will be reinstalled so that access is the same prior to the Project taking place. NL Hydro will not continue to maintain the 2.8 km woods access road following the decommissioning of the WCS.

2.3.2 Removal of the Water Control Structure and Restoration of the Stream Channel

Prior to removal of the WCS, the site will be prepared by clearing or cutting back overgrown vegetation. This will allow access by heavy equipment to the shoreline surrounding the WCS and in-water work areas. Erosion and sediment control structures will be installed along the stream banks around cleared or disturbed areas. An area to stockpile or dispose of rotting timber removed from the WCS will be cleared adjacent to the site.

Once the site is prepared, a cofferdam will be constructed to isolate one side of the stream channel for in-water work (Figure 2.5). The configuration of the Long Lake WCS lends itself to staged removal as water can flow freely through one or two openings while others are removed. The cofferdam will be constructed using clean, non-erodible materials such as sandbags, large bulk bags filled with sand or gravel, or AquaDams. The specific cofferdam construction will be determined by the contractor. The WCS, including the wing walls, sluice walls, and rock-filled abutments will be removed using heavy equipment, such as an excavator. The debris will be loaded for disposal at a suitable site. The deck and base of the WCS will then be removed in preparation for restoration of the stream channel.

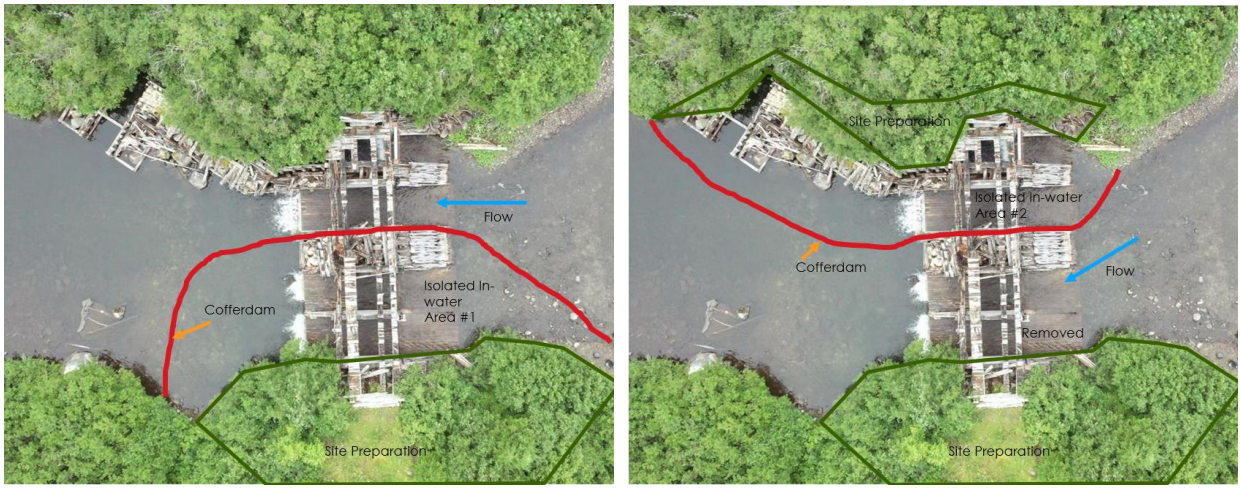

Figure 2.5 Proposed Removal of Long Lake Water Control Structure

Following the removal of debris, the stream bed and shoreline will be restored to match the existing conditions and provide long-term stability against erosion. Restoration of the stream channel will be determined in the field based on existing on-site constraints and the existing channel. Final boulder placement will be decided in the field. The restored stream channel will include a low-flow channel (e.g., thawleg). Cobble, rubble and boulders from the abutments or boulders from the in-water work area (if needed) will be placed within the stream channel using heavy equipment to create a more natural channel slope and provide areas of energy dissipation or resting areas for fish. Additional appropriately sized coarse material (e.g., cobble and boulder) to restore the stream channel will be supplemented as required to achieve the desired design. The intent is to use available materials onsite and return rocks from the WCS to their original location in the stream, prior to supplementing with additional off-site material.

The stream bank near the wing walls will be recontoured to a more natural slope. Mulch, hay, or rocks from the abutments will be used to stabilize the streams banks. The stream bank will be revegetated with native plants (i.e., alders).

Once the in-water work has been completed on one side of the stream channel, the isolated area will be breached to provide hydraulic connection to the brook, and the alternate side will be isolated, removed, and restored as using the same approach.

2.4 WASTES, DISCHARGES AND EMISSIONS

During Project activities, emission sources will include mobile equipment and possibly temporary power generation to support a pump. Equipment will have exhaust systems regularly inspected and mufflers will be operating properly. Equipment will meet the requirements of the provincial *Air Pollution Control Regulations* under the *Environmental Protection Act.*

Hazardous waste materials will not be generated in large quantities and will be disposed of through conventional waste-oil and hazardous waste disposal streams in accordance with NL Hydro's standard environmental management processes.

2.5 SCHEDULE

The undertaking is anticipated to take a month to complete. Project activities will commence during low flow periods in July to September 2024

2.6 ALTERNATIVES

The Long Lake WCS was chosen as the preferred option to fulfill the FHCP for several reasons, including:

- There was sufficient habitat area
- Ease of access
- The stream restoration required a relatively simple channel design
- There was a natural riffle upstream of the WCS which controls the water the water level in Long Lake and therefore water levels in the lake were not anticipated to be altered by the removal of the WCS
- The WCS was considered abandoned
- There were few stakeholders

Two alternative habitat compensation options, however, were also examined to fulfill the requirements of the FHCP (Stantec 2021). The locations of the additional offsetting opportunities relative to the Project are shown in Figure 2.6.

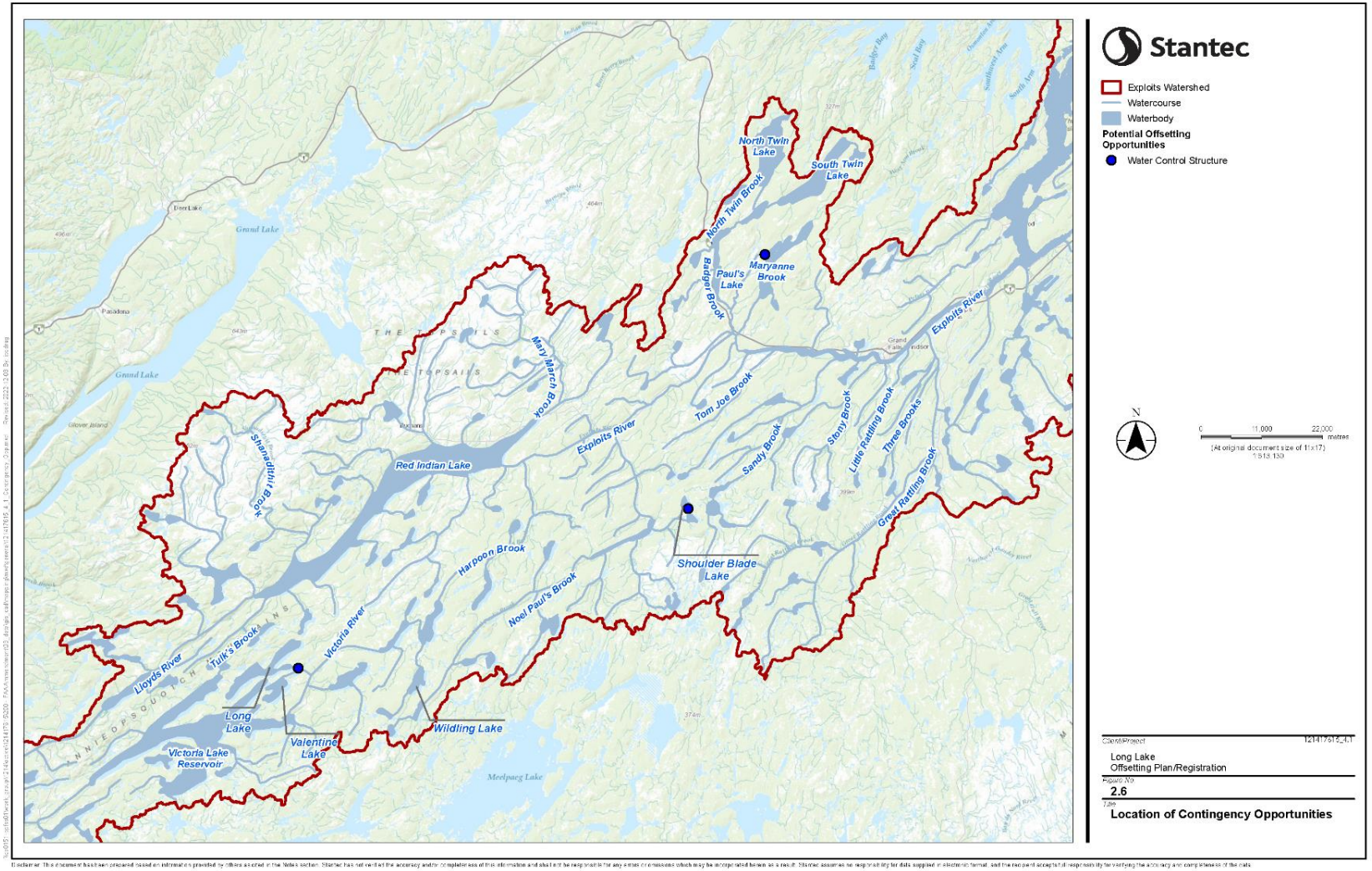

Figure 2.6 Locations of Offsetting Opportunities

2.6.1 Alternative 1: Shoulder Blade Lake WCS

Shoulder Blade Lake is a small (2.06 km^2) headwater lake which is located in the Noel Paul sub-watershed which is part of the Exploits Watershed. A contingency opportunity at Shoulder Blade Lake appears to consist of an abandoned WCS which is located at the outlet of the lake (Figure 2.7). The structure is approximately 5 m wide and may have functioned as a splash dam.

Currently, water flows through the outlet, under the bridge, and falls onto boulders which have slumped on top of the washed out WCS. The water trickles between the boulders and logs of the WCS and onto the stream bed below (Figure 2.8). The WCS at Shoulder Blade Lake is likely to be a full barrier to fish passage. There is insufficient consolidated flow to facilitate fish passage as the flow is dissipated though the boulders on top of the WCS.

The existing structure would be removed, and the stream channel would be re-designed. The site is located on Crown Land and formerly Abitibi charter lands. Resident fish species likely include brook trout, threespine stickleback, and ouananiche (Porter et al. 1974).

Figure 2.7 Shoulder Blade Lake WCS Facing Upstream

Figure 2.8 Unconsolidated Flow in Location of Shoulder Blade Lake WCS

2.6.2 Alternative 2: Mary Anne Brook WCS

The opportunity at Mary Anne Lake consists of an abandoned WCS which is located at the outlet of Mary Anne Lake (Figure 2.9-2.10). Mary Anne Lake is a large lake (15.3 km^2) located in the Badger Brook sub-watershed which is within the Exploits Watershed. The WCS is located under a concrete span multiuse trail bridge that was replaced in the recent past (Figure 2.9).

The WCS is constructed on top of a natural bedrock sill which contains a number of natural drops and pools (Figure 2.10). The structure is approximately 13 m wide and ranges in length from 7.45 to 9.62 m and consists of three large openings. Water flows through the openings at different rates due to the degradation of the WCS structure. This structure likely represents a partial barrier to brook trout, Atlantic salmon and ouananiche passage during low flow periods of the year and potentially during high flow periods.

To facilitate fish passage upstream to Mary Anne Lake, the existing structure would be removed, and the stream channel would be re-designed. The opportunity is located on Crown Land and a licence is issued for the Newfoundland and Labrador Snowmobile Federation Inc. Resident fish species likely include brook trout, sea-run Atlantic salmon, ouananiche, and threespine stickleback (Bourgeois et al. 2001, Porter et al. 1974).

Figure 2.9 Mary Anne Brook WCS Facing Upstream

Figure 2.10 Bedrock Sill Downstream of Mary Anne Brook WCS Facing Downstream

2.7 OCCUPATIONS

Table 2.2 provides the occupations, including National Occupational Classification (NOC) code, anticipated during the life of the Project.

Table 2.2 Occupations for Undertaking

Position	NOC Code	Number of Positions
Supervisor / Foreperson	NOC 7205	1
Heavy Equipment Operators	NOC 7521	2
Truck Drivers	NOC 7511	2
Labourers	NOC 7611	4
Environmental Monitors	NOC 2231	1

3.0 ENVIRONMENTAL SETTING AND POTENTIAL RESOURCES CONFLICTS

3.1 ATMOSPHERIC ENVIRONMENT

3.1.1 Environmental Setting

The Project is in the Red Indian Lake (Beothuk Lake) Subregion of the Central Newfoundland Forest (CNF) Ecoregion, one of nine ecoregions on the Island of Newfoundland (Government of NL 2020). The CNF Ecoregion is primarily inland and has a more continental climate than other surrounding ecoregions. This ecoregion also has the warmest summers and coldest winters on the island, with the potential for night frost year-round. It also experiences the least amount of fog and wind on the Island (PAA 2008).

There are limited anthropogenic sources of greenhouse gas, light or noise emissions in this remote area of the province as there are no nearby communities or major roadways.

Ambient air quality monitoring was conducted for the Valentine Gold Project, located 10 km from the WCS, in June 2020. This monitoring measured concentrations of nitrogen dioxide, sulphur dioxide, total suspended particulate matter (PM) with an aerodynamic diameter less than 30 µm (total suspended particles [TSP]), respirable PM with an aerodynamic diameter less than 10 µm (PM_{10}) and metals well below applicable 24-hour ambient air quality criteria in NL. Measured concentrations of PM (TSP and PM_{10}) ranged from 5.1 µg/m^3 to 13.8 µg/m^3 and the concentrations of TSP and PM_{10} were consistent, suggesting that the existing PM in the vicinity of the Project is made up mostly of PM_{10} (Marathon 2020).

3.1.2 Potential Resource Conflicts

Project activities will generate temporary localized air contaminant emissions due to use of equipment and vehicles during decommissioning activities. Equipment and vehicles will be maintained in good working order to reduce the amount of emissions generated. With the implementation of standard construction and operation measures, potential conflicts with the atmospheric environment are anticipated to be temporary and localized in nature.

3.2 WATER RESOURCES

3.2.1 Environmental Setting

The Project is located within the Exploits River Watershed which is the largest watershed on the Island of Newfoundland, with a total area of 10,241 km^2 (Marathon 2020). The Exploits River is one of the most important Atlantic salmon (*Salmo salar*) rivers on the Island. Long Lake is a large lake (23.9 km^2) located within the Victoria River sub-watershed (Figure 1.1), which is within the upper Exploits Watershed. Long Lake is comprised of three basins, the largest southwestern basin and a moderately sized northeastern basin which flow into a smaller eastern outlet basin. There is an abandoned WCS structure at the outlet of Long Lake.

Surface water flows in the Exploits River are regulated currently and have been regulated historically. Flow within the Exploits River is currently regulated by three major hydroelectric facilities located in Millertown, Grand Falls-Windsor and Bishops Falls (Marathon 2020). Numerous dams or WCS within the Exploit River and its tributaries were built in the mid-1900s to support logging or hydroelectric generation. Many of the WCSs were abandoned following modernization of the logging industry or are no longer required to facilitate hydroelectric generation.

The WCS on Long Lake was originally constructed in 1953 to drive pulpwood (P. Robbins 2021 pers. comm.). It was rebuilt in 1968 and eventually deteriorated sufficiently that it was abandoned in 1976. In 1987, the Long Lake WCS was reconstructed and was used to store water to sustain hydroelectric production at Grand Falls and Bishops Falls during periods of low flow.

Riparian vegetation along the majority of the lake is generally coniferous forest and shrubs (Maxar 2016). A smaller proportion of the riparian vegetation is wetland (bog habitat) particularly in the eastern outlet basin closest to the WCS (Maxar 2016).

Helicopter surveys indicate that substrates in the littoral zone are primarily coarse (e.g., cobble, boulder and rubble), with smaller areas of fine/organic substrates near bogs (Stantec 2021). There is an abundance of rock shoals along the southern side of and along the north side of islands. Deeper substrates in the profundal zone are likely fine-grained sand or tiny gravel. Sheltered bays appear to contain a high proportion of woody debris and remnant pulpwood.

Given the connectivity with Victoria River and Valentine Lake, brook trout, ouananiche, Arctic char, and threespine stickleback are likely present in Long Lake. Salmonids spawn between late September and mid-November along rocky shorelines, in tributary streams or at pond and lake outlets (Leggett and Power 1969; Lee 1971; Bruce 1976; Cowan and Baggs 1988; Scott and Crossman 1998; Wiseman 1970, 1971, 1972; Raleigh 1982). Threespine stickleback spawn in spring (Scott and Crossman 1998).

3.2.2 Potential Resource Conflicts

Potential Project effects on fish and fish habitat include potential changes in fish habitat and fish health and survival. Fish health and survival could be affected directly or indirectly through injury due to industrial equipment working in or near water, and also could be affected if fish passage to essential habitat (e.g., for rearing, spawning) becomes blocked during construction (Khan and Colbo 2008; Dunham et al. 1997). Construction activities associated with the removal of the WCS and restoration of the stream channel will require in-water work, the use of industrial equipment in or near water and potentially fording which will result in changes in the outlet of Long Lake bed and banks and riparian vegetation.

Construction activities have the potential to result in a change in the quality of surface water runoff to fish habitat through sedimentation and the entry of deleterious substances. Sedimentation / erosion associated with the loss of riparian vegetation and clearing, may negatively affect water quality through changes in total suspended solids (TSS), pH, and trace metals. The effect of increased sediment reaching fish habitat may be compounded if it occurs during the spawning, incubation or hatching period of a fish species (DFO 2019).

Introduction of sediments and contaminants into fish habitat could affect fish health and survival. Smothering of eggs, as well as behavioural or physiological changes in fish, such as inhibition of foraging, can also occur during siltation events resulting from construction and clearing during periods of high rainfall (Sweka and Hartman 2001; Herbert and Merkens 1961; Kjelland et al. 2015). Introduction of deleterious substances (e.g., grease, fuel) from machinery operating in or near waterbodies could also affect fish health and survival.

Restoration of the stream channel in the area immediately upstream and downstream of the WCS will also result in the alteration of fish habitat as a result of repositioning instream substrates. The timing of construction could influence the environmental effects of the Project on fish health and survival (e.g., Project-related sedimentation during the spawning, incubation, or hatching period of a fish species). Work will be conducted to respect DFO timing windows for the Island of Newfoundland, to protect fish and avoid direct mortality of fish larvae or eggs (DFO 2019).

Removal of riparian vegetation during construction could affect fish health due to changes in shade, protective cover, and/or external nutrient/energy inputs (Zalewski et al. 2001). Changes in fish habitat may affect predation rates or affect primary and secondary productivity upon which fish rely as food sources (Zalewski et al. 2001).

Mitigation Measures

The mitigation measures in Table 3.1 have been selected in consideration of the environmental effects pathways. They include standard proven mitigation measures for sediment and erosion control, incorporating DFO standards and best management practices, and consideration of regulations and guidelines that govern fish and fish habitat protection.

Table 3.1 Mitigation Measures for Undertaking: Fish and Fish Habitat

Category	Mitigation
Works In or Near Fish Habitat	• Project footprint and disturbed areas will be limited to the extent practicable.
	• Where possible, in-water works will be completed inside the appropriate fisheries timing windows (June 1 – September 30). Work outside the fisheries timing windows will be done in consultation with DFO. Work will follow best management practices as provided in the *Fisheries Act* Authorization.
	• Weather advisories will be followed, and work will be scheduled to avoid high precipitation and runoff events or periods, which could increase potential for erosion / sedimentation.
	• Works will be conducted on land to the extent feasible. Heavy equipment shall be kept outside the high-water mark of bodies of water, where possible or inside isolated areas.
	• Movement of equipment / vehicles will be restricted to defined work areas and roads.
	• Standard construction practices will be used, such as erosion and sediment control measures and placement and stabilization of material. Construction areas will be routinely monitored to identify areas of potential erosion and appropriate mitigation applied. Sediment control fences will be removed following revegetation and bank stabilization.
	• The duration of instream works will be limited. In-water worksites will be isolated from flowing water (i.e., by using a cofferdam) to contain or reduce suspended sediment where possible.
	• Waste material (i.e., organic material, rock or construction debris) will be stabilized, contained and/or disposed of properly at an approved site.
	• Mulching, and/or piling of cleared non-merchantable timber, slashing and cuttings will be located in areas where it cannot enter the watercourse.
	• Banks and flood plains will be adequately protected from erosion using rip rap or an applicable erosion prevention method.
Works In or Near Fish Habitat	• Materials placed in or near water will be clean, free of fines, concrete and deleterious substances and of sufficient size to resist displacement.
	• Fording will follow NL Environmental Guidelines for Fording (NLDMAE 2018) and the DFO Interim code of practice: temporary stream crossings (DFO 2020a)
	• When working in water, minimum flows will be maintained and obstructions or interference with the movement or migration of fish will be avoided.
	• The use of temporary coffer dams or diversion channels for instream work (if required) will follow the DFO Interim code of practice: temporary cofferdams and diversion channels (DFO 2020b).
	• Fish screens will be installed and maintained to prevent fish from entering water withdrawal intakes, as required.
	• Best efforts will be made by a qualified environmental professional to relocate fish from areas of in-water works or areas of water drawdown to an appropriate location in the same watershed.
	• All equipment used in water should be cleaned, drained and dried on land to prevent the introduction and spread of aquatic invasive species.
Materials Handling and Waste Management	• Work shall be performed in such a way that deleterious substances, such as sediment, fuel and oil do not enter watercourses and waterbodies.
	• Fuel storage will be a minimum of 200 m from a salmon river or tributary and 100 m from other waterbodies.
	• Refueling and servicing of equipment will not take place near watercourses; spill kits will be available on site

3.3 TERRESTRIAL ENVIRONMENT

3.3.1 Environmental Setting

The Red Indian (Beothuk Lake) Lake Subregion is characterized by glacial terrain with rolling hills, dense boreal forest and domed bogs (PAA 2008). There are numerous lakes, ponds, streams and rivers in the region. The Project is located at Long Lake in a remote area only accessible by ATV through an unmaintained access road. Vegetation and wildlife are likely undisturbed near the Project, apart from areas located along the 73 km-maintained road.

Within the subregion, Balsam fir (*Abies balsamea*), paper birch (*Betula papyrifera*), and black spruce (*Picea mariana*) are dominant tree species, and areas of rich, productive soils are present, particularly along the southern slopes of Red Indian (Beothuk) Lake (PAA 2008).

Wildlife species that are likely present near the Project include: moose (*Alces alces*), Canada lynx (*Lynx canadensis*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), muskrat (*Ondatra zibethicus*), river otter (*Lontra canadensis*), southern red-backed vole (*Myodes gapperi*), meadow vole (*Microtus pennsylvanicus*), snowshoe hare (*Lepus americanus*), and American red squirrel (*Tamiasciurus hudsonicus*), black bear (*Ursus americanus*), mink (*Neovison vison)*, and ermine (*Mustela erminea)* (Marathon 2020). Many avifauna species have also been documented including 7 raptor species, 81 species of migratory birds, and 10 other avifauna species (e.g., non-raptor species not protected under the *Migratory Birds Convention Act, 1994*).

Species at Risk

Species at risk (SAR) that are known to occur in the area and have the potential to occur within the Project vicinity are listed in Table 3.2 (Marathon 2020). For the purpose of this Registration, SAR include those species listed as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern under the NL *Endangered Species Act* (NL ESA), or the federal *Species at Risk Act* (SARA).

Table 3.2 Species at Risk that have the potential to be in the vicinity of the Project

Species Name	NL ESA Status	SARA Status
Woodland caribou (Newfoundland population *[Rangifer tarandus])*	Not Listed	Special Concern
Newfoundland marten *(Martes americana atrata)*	Threatened	Threatened
Northern myotis *(Myotis septentrionalis)*	Not listed	Endangered
Little brown myotis *(Myotis lucifugus)*	Not listed	Endangered
Common nighthawk *(Chordeiles minor)*	Threatened	Threatened
Olive-sided flycatcher (*Contopus cooperi)*	Threatened	Threatened
Rusty blackbird (*Euphagus carolinus*)	Vulnerable	Special Concern
Red crossbill (Loxia *curvirostra)*	Endangered	Threatened
Bank swallow (*Riparia riparia*)	Not listed	Threatened
Gray-cheeked thrush *(Catharus minimus)*	Vulnerable	Not listed
Evening grosbeak (*Coccothraustes vespertinus*)	Not listed	Special Concern

3.3.2 Potential Resource Conflicts

Construction activities associated with the unmaintained woods access road will require vegetation clearing and maintenance on the roadbed to facilitate the transport of equipment to the Project site. This will result in habitat loss for species on or near the unmaintained road and temporary disturbance from noise, light, dust emissions from construction activities. With the implementation of standard construction and operation measures, potential conflicts with the terrestrial environment, including SAR are anticipated to be temporary and localized in nature.

3.4 SOCIO-ECONOMIC

3.4.1 Environmental Setting

The Project is located on provincial crown lands in a rural region of central Newfoundland where there is a history of mineral exploration and mining, hydroelectric development, and forestry. The nearest communities are the Town of Millertown (52 km) and the Town of Buchans (45 km). These communities, along with Buchans Junction, Badger, Grand Falls-Windsor, and Bishop's Falls, have been shaped primarily by natural resource-based industries, including mining, forestry and hydroelectric developments (Marathon 2020). Logging has taken place in the region since the turn of the twentieth century, however, with the closing the pulp and paper mill in Grand-Falls-Windsor in 2009, forestry in the area has decreased (Marathon 2020). Although there are currently no active mines in the area, mineral exploration and development activity does take place throughout the general region, including south of the Project Area, where Marathon is developing an open pit gold mine (Valentine Gold Project).

Other land and resource use activities in the area include outfitting, camping, fishing, hunting, trapping, and recreational vehicle use (all-terrain vehicle use, snowmobiling). The closest permanent residences would be associated with the Town of Buchans, approximately 45 km away. There is a cabin located approximately 90 m to the north of the WCS. The local area also includes watercourses and waterbodies that support established recreational fisheries for brook trout and ouananiche, and may support a limited recreational fishery for sea-run Atlantic salmon. There are no known commercial fisheries in the area.

3.4.2 Potential Resource Conflicts

Construction activities associated with the Project will be ongoing for a limited amount of time (i.e., one month) and workers needed for the Project, as listed in Section 2.6, will be hired locally. Potential resource conflicts for the socio-economic environment are not anticipated for the duration of this Project.

4.0 PROJECT RELATED DOCUMENTS

To support the requirement for an amended FHCP/Offsetting Plan, the following documents have been developed:

- Stantec (Stantec Consulting Ltd.). 2021. Review and Evaluation of Conceptual Fish Habitat Offsetting Opportunities. Prepared for Newfoundland and Labrador Hydro by Stantec Consulting Ltd., St. John's, NL. January 14, 2021
- Stantec (Stantec Consulting Ltd.). 2021. Star Lake Fish Habitat Compensation Plan Supplemental Opportunities. Prepared for Newfoundland and Labrador Hydro by Stantec Consulting Ltd. St. John's, NL.

5.0 FUNDING

This Project will be 100% funded by NL Hydro.

6.0 CONCLUSIONS

In order to fulfill the offsetting requirements associated with the Star Lake Hydroelectric Generating Station, NL Hydro is proposing to decommission the Long Lake WCS and restore flow in that area. Following the decommissioning activities, the river channel within the footprint of the WCS will be restored to a more natural state to facilitate fish passage upstream, improve habitat connectivity and genetic diversity of native fish species. This will counterbalance the HADD of fish habitat resulting from the Star Lake Hydroelectric Project and provide fish access to habitats to support life history requirements of local fish species The Project is anticipated to take one month to complete and include minor access maintenance and in-water works for the decommissioning and habitat restoration activities. These activities have the potential to result in adverse effects to fish habitat and fish health and survival; however, these effects are anticipated to be temporary and localized in nature, and mitigated through standard and required measures. Overall, water levels are not anticipated to be altered by the removal of the WCS. Following the restoration activities, the Project is anticipated to restore water flow and fish passage in this area, resulting in a positive effect. NL Hydro will follow standard construction practices during the Project activities, in consultation with DFO.

September 7, 2023
Date

Signature of Chief Executive Officer
(or approved delegate)

7.0 REFERENCES

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